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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,688	12/16/2003	Masayuki Endo	60188-730	3573

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EXAMINER	
SULLIVAN, CALEEN O	
ART UNIT	PAPER NUMBER
1756	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/735,688	ENDO ET AL.	
	Examiner	Art Unit	
	Caleen O. Sullivan	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13,16,19,24,26,29,30,32,33,38,40 and 41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13,16,19,24,26,29,30,32,33,38,40 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/28/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/28/07 has been entered.

2. Claims 13, 16, 19, 24, 26, 29-30, 32-33, 38 and 40-41 are presented.

3. Claims 11, 15, 20, 22-23, 25, 27-28, 31, 34-37 and 39 were cancelled.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 13, 16, 19, 24, 26, 29-30 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elian ('240) in view of Kawamura ('146) and further in view of Grabowski ('548).

Elian ('240) discloses a process for forming a resist pattern using a chemically amplified resist material. Although the process states that the method is for forming a negative resist structure, Elian ('240) also discusses positive chemically amplified resists and methods of forming resist patterns with such material, which mirrors the process Elian ('240) discloses for the negative resist material; therefore it is inherent that a positive chemically amplified resist material can be used in the process. (See, para 0004, 0007, 0008).

The process disclosed in Elian ('240) includes the first step of applying a chemically amplified resist material to the substrate, which contains a polymer that changes polarity when exposed to an acid. (See, para 0014). Next, Elian ('240) discloses that the resist is dried and then exposed to light, X-rays, electron beams or ion beams. The source of light for the exposure is UV between 1-400nm, and UV light typically uses light sources such as those listed in claims 19 and 38. (See, para 0039). Then Elian ('240) discloses, the resist is heated and developed with an aqueous-alkaline developer solution. (See, para 0014). This disclosure meets the limitation of claims 13 and 16 where a resist film of a positive chemically amplified resist material is formed and then a resist pattern is formed by developing the resist film with developer after irradiating through a mask.

Elian ('240) goes on to disclose that a sulfonic acid is liberated during the process. (See, para 0017). Elian ('240) also discloses that the resist used in the process contains a polymer that under acid catalysis will release a sulfonic acid and preferably contains a tert-butyl ester group as well. (See, para 0031-0033). This disclosure meets the limitations of claims 13 and 16, where the chemically amplified resist material includes a base polymer for generating sulfonic acid through irradiation with light and the limitation of claims 13 and 16, where the resist includes a dissolution inhibitor for generating sulfonic acid.

However, Elian ('240) fails to disclose that the base polymer is poly (styrenesulfonic acid-t-butyl ester) or poly (styrenesulfonic acid-2-methyl-adamantyl) or that the dissolution inhibitor is an ester of styrenesulfonic acid such as styrenesulfonic acid-t-butyl ester or styrenesulfonic acid-2-methyl-2-adamantyl ester. Moreover, Elian ('240) fails to disclose that the light component from the irradiation source enters the resist film at the Brewster's Angle.

Kawamura ('146) discloses such base polymers and dissolutions inhibitors that are used in positive tone radiation sensitive layers. Kawamura ('146) discloses a radiation sensitive layer that is used in forming a radiation sensitive printing plate precursor. The polymer of the positive working photosensitive layer preferably includes a sulfonic acid ester group as a functional group. (See, col.5, 5-27). Kawamura ('146) further discloses the make up of the binder, which includes a polymer that decomposes when acted upon by heat or acid to become water or alkali soluble, includes sulfonic acid ester polymers. (See, col.17, 50-65). Kawamura ('146) also gives specific examples of sulfonic acid ester compounds that can comprise the polymer. (See, col.18, 1p-1 to 1p-8). This disclosure meets the limitation of claim 13, 16, where the dissolution inhibitor for generating sulfonic acid through irradiation with light is an ester of styrenesulfonic acid. Moreover, this disclosure meets the limitations of claims 26 and 29-30.

Still, Elian ('240) in view of Kawamura ('146) fails to disclose that the light component from the irradiation source enters the resist film at the Brewster's Angle.

Grabowski ('548) discloses directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches the limitation of claim 20 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the teachings of Elian ('240) in view of the teachings of Kawamura ('146) further in view of the teachings in Grabowski ('548) because Kawamura ('146) teaches that one can form a resist film of positive chemically amplified resist material that includes a sulfonic acid ester polymer as a base polymer and styrenesulfonic acid t-butyl ester as a dissolution inhibitor to release sulfonic acid upon irradiation with light, and Grabowski ('548) teaches that exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

7. Claims 32-33 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breyta ('220) in view of Grabowski ('548).

Breyta ('220) discloses a radiation sensitive resist composition that includes an acid generator a polymer and an acid labile group. Breyta ('220) discloses that the acid labile compound is preferably chemically bonded to the polymer, and upon exposure to acid the acid labile component undergoes a polarity change, which results in dissolution differentiation. (See, col.2, 8-10). The acid labile compound is preferably a compound having an acid cleavable ester group. (See, col.2, 10-11). This disclosure in Breyta ('220) meets the limitation of claim 32 and 33 where the chemically amplified resist material includes a dissolution inhibitor that is an ester of acrylic acid, methacrylic acid or ά-trifluoromethylacryclic acid.

Breyta ('220) discloses that preferred acid labile groups are ester groups such as t-butyl and ά-methyl benzyl esters of carboxylic acids. (See, col.2, 53-56). Breyta ('220) further discloses that the acid labile compound is chemically bonded to the polymer, which can include vinyl polymers such as poly (acrylic acid) and poly (methacrylic acid). (See, col.3, 9-25). This disclosure meets the limitation of claim 33 where the chemically amplified resist material includes a base polymer that is an ester of

polyacrylic acid, polymethacrylic acid or poly (ά-trifluoromethylacrylic acid). Although Breyta ('220) does not explicitly disclose that a carboxylic acid is generated, it is inherent that a carboxylic acid is generated because the acid labile compound, which will be released on exposure to an acid, is an ester of a carboxylic acid.

Breyta ('220) goes on to disclose that the resist material can be used in a process to form a resist film and pattern. The film is first coated onto a substrate and then heated to remove solvent from the film. (See, col.3, 51-55). Next, Breyta ('220) discloses that the film is image wise exposed to a low does of radiation or electron beam radiation preferably DUV with suitable radiation sources including excimer laser, which meets the limitations of claims 40-41, and upon exposure acid is generated. (See, col.3, 56-64).

After the exposure Breyta ('220) discloses that the film is heated again and the acid cleavable ester group, which is an ester of a carboxylic acid is cleaved and the polymer becomes soluble in alkaline developer. (See, col.3, 65-4,9). The last step in the process disclosed in Breyta ('220) is the development of the image in the film using an aqueous base solvent to produce a positive tone image. This disclosure in Breyta ('220) teaches the limitation of claims 32-33 where a resist film of a positive chemically amplified resist material is formed, and then a pattern is developed with a developer after irradiating through a mask.

Still, Breyta ('220) fails to disclose the limitation of claims 32-33 where the light component from the irradiation source enters the resist film at the Brewster's Angle. However, Grabowski ('548) discloses such a process step.

Grabowski ('548) discloses directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches

the limitation of claims 32-33 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the pattern formation method disclosed in Breyta ('220) with the irradiation step disclosed in Grabowski ('548) because Grabowski ('548) teaches that exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

Response to Arguments

8. Applicant's amendments and arguments, filed 06/28/07, with respect to the objection to the specification have been fully considered and are persuasive. The objection to the specification has been withdrawn.

9. Applicant's amendments and arguments, filed 06/28/07, with respect to the rejection of claims 13, 16, 27-29 and 34-37 under 35 USC 112, second paragraph, have been fully considered and are persuasive. The rejection of claims 13, 16, 27-29 and 34-37 under 35 USC 112, second paragraph, has been withdrawn.

10. Applicant's arguments filed 06/28/07 have been fully considered but they are not persuasive.

Foremost, Applicant argues that Grabowski does not appear to teach or suggest the use of light entering at the Brewster's angle; however Grabowski teaches a process where a beam of light is directed at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). Although it does not explicitly state the light enters the resist layer at the Brewster's angle, one of ordinary skill in the art would appreciate that if the light is directed at such

an angle towards the resist layer it follows that the light entering the resist layer would include a component at the Brewster's angle.

Applicant also argues that Kawamura ('146) fails to disclose a sulfonic acid ester as a dissolution inhibitor for generating sulfonic acid through irradiation with light. However, Kawamura ('146) discloses a radiation sensitive layer used in forming a radiation sensitive printing plate precursor, which preferably includes a sulfonic acid ester group as a functional group. (See, col.5, 5-27). Kawamura ('146) further discloses the binder includes a polymer that decomposes when acted upon by heat or acid to become water or alkali soluble, includes sulfonic acid ester polymers. (See, col.17, 50-65). Kawamura ('146) also gives specific examples of sulfonic acid ester compounds that can comprise the polymer. (See, col.18, 1p-1 to 1p-8). Although Kawamura ('146) does not explicitly state that sulfonic acid ester compound comprising the polymer is a dissolution inhibitor that generates sulfonic acid through irradiation with light, the exemplary compounds are the same as those listed in claims 13, 16, 26 and 29-30 and the compounds decompose when acted upon by heat or acid; therefore it follows that the compound functions as a dissolution inhibitor for generating sulfonic acid through irradiation with light.

Applicant further argues that because Elian ('240) belongs to the field of semiconductor fabrication process and Kawamura ('146) belongs to the printing plate precursor for printing there is no motivation to combine the references as set forth in the previous Office Action. However, the fact that references used belong to different fields does not negate that one of ordinary skill in the art would be motivated to combine the references as set forth in the previous Office Action. Moreover, the references would still qualify as analogous art, because the process steps and materials disclosed in Kawamura ('146) are also commonly used in semiconductor fabrication processes, such

as the process disclosed in Elian ('240). Therefore, one of ordinary skill in the art would be motivated to combine the references.

Lastly, Applicant argues that Breyta ('220) fails to discloses a dissolution inhibitor that generated carboxylic acid through irradiation with light, which is made of an ester of acrylic acid, methacrylic acid or ά-trifluoromethylacryclic acid. However, Breyta ('220) discloses a radiation sensitive resist composition that includes an acid generator, a polymer and an acid labile group. Breyta ('220) discloses that the acid labile compound is preferably chemically bonded to the polymer, and upon exposure to acid the acid labile component undergoes a polarity change, which results in dissolution differentiation. (See, col.2, 8-10). The acid labile compound is preferably a compound having an acid cleavable ester group. (See, col.2, 10-11). Breyta ('220) also teaches the preferred acid labile groups are ester groups such as t-butyl and ά-methyl benzyl esters of carboxylic acids. (See, col.2, 53-56).

Although Breyta ('220) does not explicitly disclose that a carboxylic acid is generated, it is inherent that a carboxylic acid is generated because the acid labile compound, which will be released on exposure to an acid, is an ester of a carboxylic acid. Moreover, acid is generated in the resist via patterning exposure step. From the disclosures in Breyta ('220) one of ordinary skill in the art would appreciate that the resist material disclosed in Breyta ('220) includes the dissolution inhibitor for generating carboxylic acid through irradiation, recited in claims 32 and 33.

As discussed above Grabowski ('548) does disclose the limitation of claim 32-33 just as it discloses the limitation of claims 13 and 16, where the light entering the resist material includes a component at the Brewster's angle.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caleen O. Sullivan whose telephone number is 571-272-6569. The examiner can normally be reached Monday-Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/COS/, 07/03/07

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